between breast fed children, in that more breast fed children were in the WSS group. As this group as a whole is so small it is unlikely to affect the overall outcomes.

6.2 Group Equivalency/Socio-Economic:

Factors that may have affected the mothers' reporting were equivalent in both groups in terms of literacy, fathers' employment, previous contact with health education through the Community Health Worker (CHW) program, maternal age, and number of children/mother. Only rural/urban origin and time in Pakistan varied. There were a higher percentage of mothers in the WSS group who were from a urban setting in Afghanistan (22%) than the ORS group (2%). This difference will likely not affect the outcome variables as the number of urban women as a whole was very small. The WSS group had been living in Pakistan on average for a longer time, thus potentially more exposed to western medical concepts. This factor may not prove to be critical because both groups had equivalent exposure to CHW health education and literacy levels. Type of latrines in use, the condition of the latrines, and the use of protected (piped) versus unprotected water sources (wells, etc.) are not significantly different between the two groups (see Table 3).

6.3 Treatment Regimes Followed by Study Cases:

Slightly more women in the WSS group (84%) chose to use the ORT treatment alone than those in the G-ORS group (74%). Yet 12 percent used an antibiotic in the G-ORS group as opposed to only 1.6 percent in the WSS group. A mother is 7.14 times more likely to add an antibiotic to the treatment regime when using G-ORS as opposed to WSS (relative risk or RR .14) (see Table 4). As it is unknown what effect other drugs may have on the outcomes, analysis was stratified to determine outcomes for those that exclusively used the ORT.

6.4 Failures:

Eighty-two percent of children recovered within seven days and did not require referral for dehydration on WSS versus 59 percent on G-ORS. Failures were defined as those children suffering from diarrhea more than seven days or those were referred back to the BHU for dehydration. The chances of a child failing were 3.70 (RR .27) times higher on G-ORS than on WSS. Those referred due to medical problems (development of dysentery or other infectious processes) or with incomplete follow-up (due to camp security problems) unrelated to ORT treatment were equivalent in both groups. They were not considered in the specific outcome analysis (see Table 5).

6.5 Duration of Diarrhea:

Mothers whose children were on WSS reported a significantly reduced duration of diarrhea than those on G-ORS (see Figure 1). Both groups who were followed throughout the study period on the exclusive ORT of interest (WSS-112 and G-ORS-135) had suffered diarrhea for an equivalent time period before entering the study, 2.61 and 2.37 mean days respectively. Duration of diarrhea was significantly less for those on WSS (3.99 days) versus G-ORS (6.55 days). In terms of total duration, the G-ORS suffered on average 2.32 days longer than the WSS group. The median duration of diarrhea for the entire episode was six days on WSS as opposed to nine days on G-ORS (see Table 6a). Considering cumulative rates of recovery, the chances of a child recovering by day five are 5.95 times higher if on WSS as opposed to G-ORS (see table 6b). Furthermore,

by day seven a greater divergence is seen as close to three quarters of the WSS children had recovered while only 25 percent of those on G-ORS (see Figure 2).

6.6 Dietary Impact:

Cases that were still being followed by day three, who used ORT exclusively on a daily basis and were not eventually referred for dysentery, were selected for dietary analysis (WSS-148 and G-ORS-147). Contrary to hypothetical concerns regarding cereal-based ORT replacing food, mothers reported *higher* feeding frequencies, *higher* amounts of food consumed, and *better* appetites for their children on WSS (see Table 7).

Feeding frequencies: While more children in the G-ORS group on entry into the study started with decreased feeding frequency rate from their normal feeding patterns (74%), this percentage by day three fell to only 62 percent. On the other hand, a little over half the cases on WSS (53%) were eating less frequently than normal on entry, but this fell sharply to 14 percent by day three on treatment. In other words, the likelihood of a child eating less often than normal by day three on treatment was 4.35 times higher (RR .23) if using G-ORS than those using WSS.

Appetite: More mothers reported that their child's appetite was decreased in the G-ORS group than the WSS group on entry into the study, 87 percent versus 54 percent respectively. But after three days on treatment, 73.5 percent of the mothers reported that their child's appetite was still diminished in the G-ORS group as opposed to only 13 percent of those on WSS. The chances of a mother reporting that her child still has a poor appetite by day three of treatment are thus 5.88 times (RR .17) more likely if using G-ORS packets versus WSS.

Amounts of food consumed: On entry into the study, a higher percentage of children were consuming less than normal amounts of food in the WSS group (56%) than the G-ORS group (37%). By day three this trend was reversed, with a higher percentage of children reported to be consuming less than normal quantities in the G-ORS group (33%) than those on WSS (11.5%). In other words, the likelihood of a mother reporting that her child was taking less food than normal was 3.13 times higher (RR .32) for those on G-ORS than those on WSS after three days of treatment.

Breast feeding: The same patterns as seen with food consumption were reported by mothers with regard to breast feeding. More children entering the study in the WSS group were consuming diminished amounts of breast milk than the G-ORS group, (17% and 8% respectively). But after three days of treatment this trend was reversed, (WSS 1% and G-ORS 9%). The chances of a child taking less breast milk than normal after three days of treatment was 7.14 times higher (RR .14) if treated with G-ORS versus WSS.

ORT consumption: Mean intake of ORT was less for those consuming WSS to accomplish prevention of dehydration and recovery. The G-ORS group consumed on an average of 657 ml/day while the WSS group consumed 264 ml/day (see Table 8).

6.7 Perceptions of Stool and Emesis Rates:

The differences in reported stool frequency, stool consistency, and emesis were remarkable between the two treatment groups (see Table 9).

Stool frequency rates: By day three the reported mean stools per day were 2.52 for those children on WSS as opposed to 5.15 on G-ORS. In other words, children on G-ORS after three days of treatment had 51 percent more stools per day than those on WSS. The chances of a child still having an increased frequency rate by day three of treatment were 5.56 times greater (RR .18) than those using packets versus WSS.

Stool consistency: Stool purging rates were further validated by mothers' perception of stool consistency by the third day of treatment. The likelihood of a mother reporting that her child's stools was still loose were 2.70 times higher (RR .37) if treated with G-ORS than with WSS.

Vomiting: A small number of children who were vomiting entered the study. While not statistically significant, fewer children were still vomiting by day three on WSS than on G-ORS. The percentage of children vomiting when using G-ORS went from 19 percent on entry into the study, down to only 12 percent by day three. But on entry 26 percent were vomiting in the WSS group, this dropping to six percent by the third day of treatment.

6.8 Impact on Weight:

WSS had a remarkably significant impact on recovery weight changes. While children on WSS recovered sooner and consumed less ORT to prevent dehydration, their mean weight changes from baseline reflected weight *gains*. Children on G-ORS *lost* weight. Looking at both groups irrespective of age, children on WSS gained an average of 164 grams while those on packets lost 162 grams. Stratifying for age this pattern remains the same and is highly significant (see Table 10).

6.9 Safety of WSS:

To assess retention of the correct ORT recipe and test the safety of solutions made in the home by mothers, all cases who could be found (G-ORS-128 and WSS 136) one to three months after the quantitative field trial were visited again. Although the data collection team felt that 25 percent of mothers made some sort of error in measuring salt while making WSS, (typically using too little) none of the samples were out of the normal range limits. The mean WSS sodium concentrations were actually safer at 57.19 mmol/l (ideal 50) as opposed to the G-ORS mean sodium of 83.52 mmol/l. No WSS samples were above the upper limits of normal (110 mmol/l) while 6 percent of the G-ORS were. Furthermore, there was a greater range in G-ORS sodium samples (range 16-130 mmol/l) than in the WSS samples (range 20-110 mmol/l) (see Table 11).

6.10 Training Methods and Materials:

The surveyed mothers felt that all WSS ingredients would be available and not costly. They were satisfied with pinch and fist means of measuring and preferred using a liter container rather

than glasses for water. The majority (86%) stated that they preferred to be trained by a "literate person" or LHV with practical demonstrations as the methodology (88%).

6.11 Mothers' Subjective Evaluation:

After having one to three months experience with the product, mothers were asked their qualitative opinions about the ORT. When questioned about difficulties in using the therapy (G-ORS or WSS), there was no significant difference between the two groups in terms of reported problems (see Table 12). Mothers in the WSS group, all of whom had used G-ORS packets in the past, were asked to compare the products in terms of eight qualitative parameters. WSS was preferred by these user mothers to G-ORS in all respects with the exception of preparation (see Figure 3). Eighty-three percent of the mothers felt that packets are easier to prepare than WSS. Otherwise, mothers considered WSS to be more available (96%), less costly (75%), more effective (78%), and a healthier product (87%). Slightly more mothers thought WSS to be better tasting (65%) and more acceptable to their child (63.5%). Almost all of the mothers (90%) felt they would be most apt to use WSS on their return to Afghanistan (see Table 13).

7. DISCUSSION

It must be kept in mind that the major measurement instrument of this study was the mother. While clinical trials can demonstrate efficacy of a treatment modality, unless the user perceives similar benefits, the treatment will never be adopted. This is a critical issue in introducing new health care interventions. It was therefore the intention of this study to determine if the previously demonstrated clinical efficacy of a cereal-based ORT (as WSS) would be equally recognized by the user-mother. As a result, most of the variables measured in this study are indices from the mother's point of view. Only weights, hydration status, and solution sodium levels are reproducible values, while all others are perceptions of the mother.

Among these latter measures, the study used objective indicators that mothers notice on a daily basis, such as stools/day, stool consistency, appetite, feeding frequencies, etc. Due to the field setting of the study and the nature of the Afghan culture that prohibits staying in people's homes over an extended time period, the investigators have no way of knowing the "true" values of these measurements. There is already a wealth of data gathered from clinical trials that have measured clinical efficacy (see Section 10. Bibliography: Clinical Studies on Cereal-Based ORT for the listings of publications). A strict clinical study was not the aim of this study because what was being measured was not clinical values, but rather the mothers' perception of outcomes. Only by these means can it be determined if a intervention can successfully be introduced to a population. Therefore, these indicators as reported by mothers were used along with their subjective general opinions to validate whether WSS would be perceived as effective and acceptable to Afghan women.

While the original hypothesis was to investigate if WSS would be viewed *as effective* as packet ORS under field conditions, this study demonstrates perceived superiority when used with non-dehydrated children. Meta-analysis of the clinical trials that tested rice ORS with dehydrated children has demonstrated a mean stool output reduction rate of 18 percent in non-cholera cases and 36 percent in cholera cases.[7] Wheat ORS yields slightly fewer stool reduction rates than rice ORS.[8] Therefore, it was predicted that mothers may not recognize any appreciable reductions in purging rates. This study on the contrary demonstrates greater than 50 percent perceived reduction in stool frequency rates among WSS group as compared to the G-ORS

group. Furthermore, mothers reported a duration of diarrhea that was 39 percent less on WSS than on ORS packets. Mothers reported stool consistency returning to normal by day three in more cases on WSS as well. These results suggest that WSS is more effective when used *early* in the course of disease and when the child is not yet volume depleted or showing signs of dehydration.

Most significant is the dietary impact of WSS. For years medical authorities have been proposing the *theoretical risk* that cereal-based oral rehydration therapy will be seen by mothers as a food, and thus will replace food during diarrhea. This theory has been so well publicized that the medical community has taken it as fact and thus been reluctant to use a cereal-based oral rehydration solution. And yet this hypothetical concern has never been validated by field studies. This study is the first of its kind to test this hypothesis. While it is impossible under field conditions to accurately measure dietary intakes, our indirect measures clearly suggests that WSS actually has a positive dietary impact. Mothers reported improved appetites, increased food and breast milk intake, and more frequent feeding patterns. Children gained weight on WSS as opposed to those on G-ORS who lost.

The qualitative data gathered from the mothers who had used both packets and WSS validate the quantitative findings as well. Mothers not only on a daily basis were reporting clinical improvements, but when asked months later about perceptions regarding effectiveness and the health value of WSS, they considered it superior to G-ORS.

While the potential for mixing errors is as great as SSS because there are three ingredients to measure, WSS is inherently *safer*. Wheat flour is a complex carbohydrate that yields solutions with lower osmolar values when prepared with variable amounts of water. Furthermore, in order to make the solution liquid enough for the child to drink, mothers have to add adequate amounts of water. Therefore, the risk of mothers mixing a hypertonic solution is negligible. While there can be the same errors in salt measurements, using the pinch method yields safe amounts. The observed error rate in salt measures was 25 percent, but laboratory values were all within normal limits. Therefore, under field conditions, mothers prepare a safe solution.

8. CONCLUSION/RECOMMENDATION

This study, "A Comparative Home Field Trial of Wheat Salt Oral Rehydration Solution (WSS) Among Afghan Refugee Children" was conceived to find a safer, more suitable home-based oral rehydration solution to serve as an *alternative* to salt sugar solution (SSS).

At present the Afghan Refugee CDD Programme in NWFP bases its strategies solely on the use of ORS packets which are available in the Basic Health Units and through purchases in the local markets. ORS packets have not only been proposed for treatment of all diarrhea cases reporting to the BHUs, but as first line dehydration prophylaxis in the homes. Surveys in 1989 revealed that while knowledge of ORS was already high (95%), user rates were only 21 percent. A more recent survey shows that this trend continues with spontaneous home use rates of six percent.[9]

Reasons for this low utilization may be related to the inability of the present glucose based ORS to reduce the magnitude of diarrhea in terms of stool frequency rates, stool consistency and duration of diarrhea. These parameters are more important tangible problems to a busy mother than the subtle signs of dehydration.

Made in the home without close supervision, the same mixing errors found with SSS have been identified with ORS. An incorrect recipe was recited by 70 percent of mothers, of these, 65 percent would yield a hypertonic solution, and 31 percent a dangerously hypertonic solution.[10]

At present the CDD Programme intends to distribute two packets for each case of diarrhea coming to the BHU, as well as another two for every household through the Community Health Worker programs. Looking at NWFP alone, with a population estimated at 2.24 million and using the diarrhea morbidity rate of 4.7 episodes per child under age five per year, the annual ORS packet requirement would be over 7.5 million (3,790,080 packets for BHU use alone). Only six million ORS packets were available for the entire country of Pakistan in 1990. While donors are supplying this huge amount, the cost and logistics of an equitable distribution as such are considerable.

Aside from this, another more important question is whether this packet-only policy will be *sustainable* not only in Pakistan, but in Afghanistan. It is unlikely that donors will continue to meet the heavy supply requirements in Afghanistan. There may not be health units and community health worker programs in every population area. It is well known that the communications and transportation infrastructure are not adequate for distribution of ORS packets now or in the foreseeable future. Therefore, there is a critical risk that we are educating a population to use a commercial product that will likely be unavailable in Afghanistan.

Furthermore, a dependency on these commercial packets to treat childhood diarrhea may have been created, resulting in mothers subsequently losing confidence in their own home technologies. This negates maternal empowerment. Mothers are required to use resources outside the family compound.

ORS still remains the treatment of choice for electrolyte deficient dehydration. The working hypothesis was, therefore, to determine if WSS was as effective as ORS for the *prevention of dehydration* and diarrheal case management. As the data reveals, results go beyond demonstrating equivalent benefits when comparing WSS to ORS packets, rather an improvement has been observed.

While ORS should remain the treatment of choice *under supervision in the BHU* setting to correct electrolyte imbalances, this study strongly recommends WSS as the first line treatment of choice in the *home* for the following reasons:

- It is difficult for Afghan women to accurately measure one liter of fluid. Without supervision, G-ORS packets made in the homes are often dangerously hypertonic, increasing diarrhea and the risk of hypernatremia. Due to the biochemical and physical properties of the starch polymer of wheat, errors in water measurement will be less likely to yield hypertonic solutions. Therefore, under household conditions WSS is inherently safer than both SSS and G-ORS packets.

- By using WSS early in the course of diarrhea, its efficacy may obviate the need for G-ORS packets. As a result, precious supplies of packets can be saved for those cases reporting to the BHUs who need ORS to correct electrolyte imbalances.

- As WSS is a cheap and readily available household intervention, this will empower the Afghan mother and validate her own home technologies.

- The positive nutritional impact of WSS can potentially reduce the risk of malnutrition commonly associated with diarrhea.

Repatriation has now begun and refugees face returning home to a country without a solid health infrastructure and which is devoid of adequate supplies of ORS packets. Therefore, it is urgently recommended that this population be given the opportunity to learn this home technology in order to treat the likely higher diarrhea rates that will occur. With this additional diarrhea treatment intervention, it is hoped that Afghan mothers can return home with an alternative which is safe and more accessible.

TABLE 1. CAMP EQUIVALENCIES

Figures represent statistic averages reported during April-September 1990 per/1,000 population, excluding water supply.

INDICATOR*	G-ORS CELL		WSS CELL	
* per/1,000 pop	Lakhti Banda	Shin Dand	Thal I	Thal II
Sample Size	n=62	n=122	n=129	n=54
Years camp open	11	5	11	11
Years PH program	5	2	5	5
Population	19,097	16,116	12,669	17,141
BHU visits/mo	167	170	258	206
Simple Diarrhea	5.4	17.0	16.2	10.2
Dysentery	6.8	4.5	3.3	2.5
Parasites	2.2	8.7	2.4	2.2
EPI coverage Under 1	57%	42%	65%	54%
* Water Sources	7.3	11.7	9.3	2.9
**Protected source	1.2	8.6	4.4	2.8
Improved wells	5.1	2.1	3.5	.12
Unimproved wells	1.0	.95	1.3	.00

* Water sources = Totals of COMMUNITY water sources (does not include wells in individual family compounds) as of Dec 1990.

** Protected sources:
1. Surface tanks supplied by tube wells, protected springs, tanker trucks.
2. Standposts supplied by tube wells, protected springs, tanker trucks.
3. Community handpumps

TABLE 2. PHYSIOLOGICAL GROUP EQUIVALENCY OF STUDY CHILDREN

PARAMETERS	WSS CELL n=183	G-ORS CELL n=183	PROBABILITY
SEX:			
MALE	88 (48.1)	107 (58.5)	NS
FEMALE	95 (51.9)	76 (41.5)	
AGE IN MONTHS:			
Mean	24.84	20.44	<.002
±SD	±14.00	±12.30	
Age groups			
06-12	48 (26.2)	69 (37.7)	
13-24	53 (29.0)	56 (30.6)	
25-36	45 (24.6)	37 (20.2)	
37-48	18 (9.8)	16 (8.7)	
49-59	19 (10.4)	5 (2.7)	
WT/HT % OF MEDIAN NCHS:			
Mean	91.20	92.50	NS
±SD	±5.94	±6.49	
TYPE OF FEEDING:			<0.019
Breast Feeding	14 (7.7)	5 (2.7)	
Br-Fd+Weaning	82 (44.8)	104 (56.8)	
Usual Feeding	87 (47.5)	74 (40.5)	
NORMAL FEEDING/DAY:			
Mean	6.48	5.56	<.0001
±SD	±1.84	±1.73	
DAYS OF DIARRHEA (on entry)			
Mean	2.55	2.24	NS
±SD	±1.05	±1.04	
STOOLS/DAY (on entry)			
Mean	6.61	5.79	NS
±SD	±2.99	±1.70	

( ): Number in parentheses indicates percentage
NS: No statistical difference.

TABLE 3. SOCIO-ECONOMIC GROUP EQUIVALENCY OF REPORTING MOTHERS

PARAMETERS	WSS CELL n = 138	G-ORS CELL n = 127	PROBABILITY
ORIGIN			
Urban	30 (21.74)	2 (1.57)	< .00001
Rural	108 (78.26)	125 (98.43)	
* YEARS IN PAKISTAN	10.06 ±3.28	8.22 ±3.43	< .001
EMPLOYMENT			
Income	111 (80.00)	100 (79.00)	NS
Non Income	27 (20.00)	27 (21.00)	
LITERACY			
Literate	34 (25.00)	25 (20.00)	NS
Illiterate	104 (75.00)	102 (80.00)	
* MATERNAL AGE	31.96 ±9.71	32.23 ±9.50	NS
* NO. LIVING CHILDREN/ MOTHER	3.90 ±1.92	4.27 ±1.80	NS
CONTACT WITH CHW PROGRAM			
Yes	41 (31.82)	44 (34.65)	NS
No	97 (68.12)	83 (65.35)	
LATRINE TYPE			
V.I.P.	81 (58.00)	60 (47.00)	NS
Simple	34 (25.00)	40 (32.00)	
None	23 (17.00)	27 (21.00)	
LATRINE CONDITION	n=115	n=100	NS
Clean	78 (67.83)	68 (68.00)	
Dirty	37 (32.17)	32 (32.00)	
SOURCE OF WATER			
Protected	44 (31.88)	52 (40.94)	NS
Unprotected	94 (68.12)	75 (59.06)	

( ): Number in parentheses indicates percentage
* Expressed as mean ±SD
NS: No statistical difference

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1. ABSTRACT

A controlled field trial comparing wheat salt solution (WSS) and glucose oral rehydration solution packets (G-ORS) for the management of uncomplicated non-dysentery diarrhea within the home was conducted between May to November 1991 among Afghan refugee children in the Northwest Frontier Province of Pakistan. The purpose of the study was to determine if WSS could serve as an alternative to the previously used salt-sugar solution (SSS) as the home-based solution of choice for the Afghan population. The specific aims of the study were to determine if WSS was equal to or better than the control (G-ORS) in terms of acceptability, perceived effectiveness, and safety.

Four refugee camps with medical services provided by the International Rescue Committee (IRC) were selected for the study, two for the WSS treatment and two for G-ORS; the treatment groups separated geographically to avoid cross-contamination of treatments. 366 children under age five with simple uncomplicated diarrhea were selected by specific clinical criteria (without dehydration or malnutrition) for each treatment group; 183 for WSS and 183 for G-ORS. After meeting the case criteria, the mothers of the selected children were trained to prepare and use WSS or ORS through a practical demonstration within the BHU. Each case was then followed for seven consecutive days in the home to assess how the children progressed and the mothers' perception of treatment effectiveness.

A significantly higher number of children on WSS (82%) recovered within seven days and did not require referral for dehydration as opposed to those on G-ORS (59%). The chances of treatment failure were 3.70 times higher for those using G-ORS than those using WSS. The median duration of diarrhoea was six days among WSS users and nine days among G-ORS users. This difference is highly significant. The likelihood of recovery by day five was 5.95 times higher if the child was treated with WSS versus G-ORS.

Mothers reported significantly reduced stool frequency rates on WSS. Those children on G-ORS after three days of treatment had a mean stool frequency rate of 5.15 stools/day versus 2.52 on WSS. Mothers also noted improved stool consistencies on WSS. The chances of the mother reporting that her child's stools were still loose by day three were 5.56 times higher if using G-ORS as opposed to WSS.

Contrary to hypothetical concerns regarding cereal-based ORT replacing food, mothers reported *higher* feeding frequencies, *higher* amounts of food consumed, and *better* appetites for their children on WSS. By the third day of treatment, 62 percent of the children using G-ORS were still eating less frequently than their reported usual rates. Yet only 14 percent of those using WSS were not eating as often as their normal pattern. After three days of treatment, 33 percent of the mothers using G-ORS said that the amounts of food their child was consuming were diminished as opposed to 11.5 percent in the WSS group. Furthermore by day three, appetites were reported as still diminished in only 13 percent of the children on WSS as opposed to 73.5 percent of the children treated with G-ORS. Children lost a mean 162 grams in the G-ORS group while those on WSS gained a mean of 163.95 grams.

When comparing the safety of WSS made in the home by mothers, the mean WSS sodium concentrations were safer at 57.19 ± 20.21 mmol/l (range 20-110 mmol/l) than G-ORS mean sodium at 83.52 ± 19.43 mmol/l (range 16-130 mmol/l).

TABLE 4. TREATMENT REGIMENS FOLLOWED BY STUDY CASES

TREATMENT REGIMENS	WSS CELL n = 183	G-ORS CELL n = 183	RELATIVE RISK (CI)
CONTINUED ORT ALONE	154 (84.2)	135 (73.8)	1.14 (1.03-1.27)
ANTIBIOTICS	3 (1.6)	22 (12.O) (.04-.45)	0.14
OTHER TREATMENTS*	26 (14.2)	26 (14.2)	NS

( ): Number in parentheses indicates percentage
CI: Confidence Interval
NS: No statistical difference

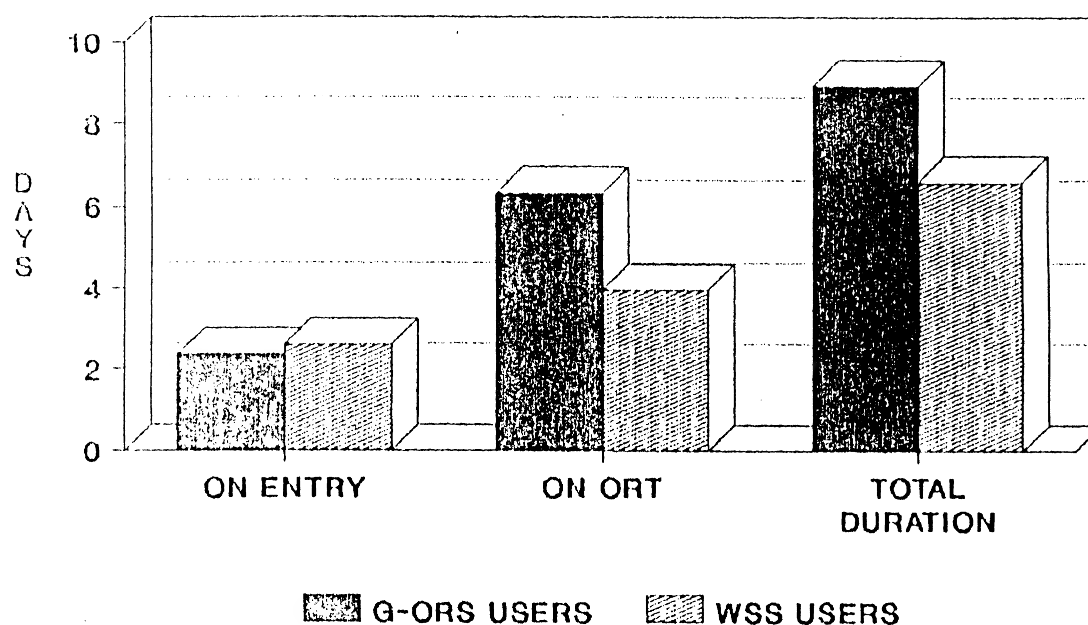
* OTHER TREATMENTS: Included Antiemetic, Antipyretics, Antimotalitics, Antiparasitic, Herbal, Unspecific drugs, and combination of these

TABLE 5. OUTCOME OF CASES TREATED WITH ORT ALONE

OUTCOME	WSS CELL n = 154	G-ORS CELL n = 135	RELATIVE RISK (CI)
RECOVERED	126 (81.8)	79 (58.5)	1.40 (1.19-1.64)
FAILED (a+b)	12 (7.8)	39 (28.9)	0.27 (0.15-0.49)
a. continued diarrhea > 7 days	9 (5.8)	32 (23.7)	0.25 (0.12-0.50)
b. refer for dehydration	3 (1.9)	7 (5.2)	NS
REFERRED for other medical problem	9 (5.8)	5 (3.7)	NS
INCOMPLETE FOLLOW-UP	7 (4.5)	12 (8.9)	NS

( ): Number in parentheses indicates percentage
CI: Confidence Interval
NS: No statistical difference
** Incomplete follow-up due to camp administrative problems and non-cooperation

FIGURE 1. MEAN DURATION OF DIARRHEA IN DAYS



G-ORS n=112/WSS n=135

TABLE 6a. DURATION OF DIARRHEA FOR CASES EXCLUSIVELY USING ORT
(Followed for seven days or recovered)

	WSS-CELL n = 135	G-ORS CELL n = 112	PROBABILITY
a. DAYS Diarrhea before study entry			
Mean	2.61	2.37	NS
SD	±1.00	±1.05	
Median	3.00	2.00	
Inter-quartile Range	1.00 - 3.00	1.00 - 3.00	
b. DAYS Diarrhea during study			
Mean	3.99	6.55	<.0001
SD	±1.61	±1.79	
Median	3.00	7.00	
Inter-quartile Range	2.00 - 5.00	5.00 - 8.00	
c. TOTAL DURATION of diarrhea (a+b)			
Mean	6.60	8.92	<.0001
SD	±2.02	±2.11	
Median	6.00	9.00	
Inter-quartile Range	5.00 - 8.00	7.00 - 10.00	

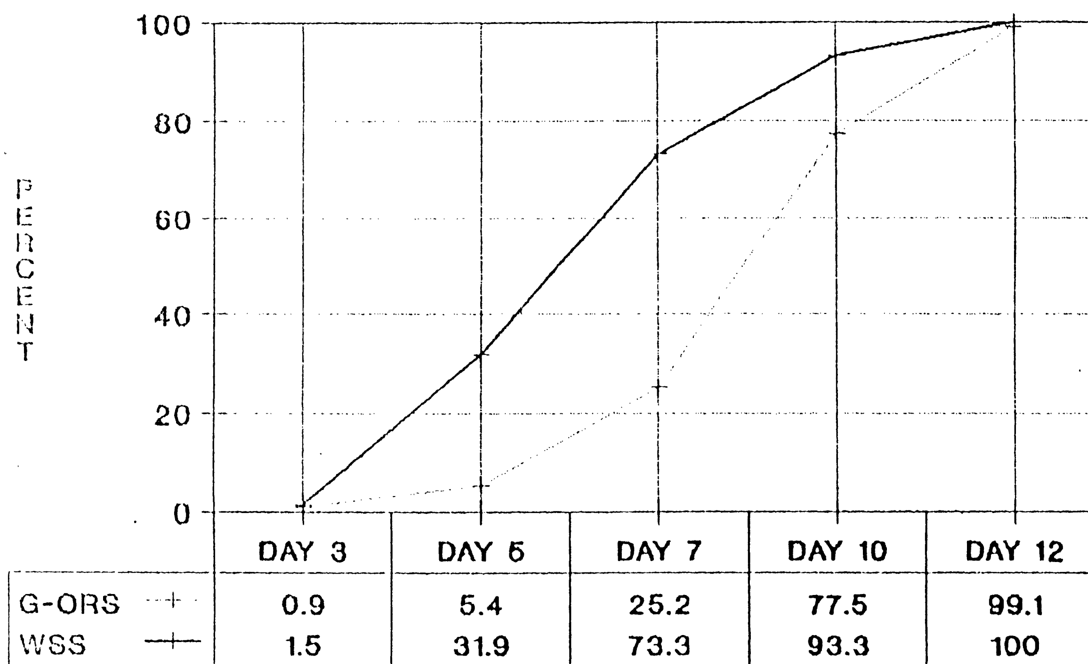
NS: No statistical difference

TABLE 6b. CUMULATIVE RATE OF RECOVERY FROM DAY OF ONSET FOR OBSERVED CASES USING ORT EXCLUSIVELY
(Followed for seven days or recovered)

DAY OF OBSERVATION	WSS-CELL n = 135	G-ORS CELL n = 112	RELATIVE RISK (CI)
	CUMULATIVE RATE % (Cases)		
3rd Day	1.5 (2)	0.9 (2)	NS
5th Day	31.9 (43)	5.4 (6)	5.95 (2.63-13.45)
7th Day	73.3 (99)	25.2 (28)	2.93 (2.10-4.11)
10th Day	93.3 (126)	77.5 (86)	1.22 (1.09-1.36)
12th Day	100.0 (135)	99.1 (110)	NS

NS: No statistical difference

FIGURE 2. CUMULATIVE RATE OF RECOVERY CASES EXCLUSIVELY USING ORT



	DAY 3	DAY 5	DAY 7	DAY 10	DAY 12
G-ORS	0.9	5.4	25.2	77.5	99.1
WSS	1.5	31.9	73.3	93.3	100

G-ORS n=112 WSS n=135

TABLE 7. FEEDING STATUS OF CASES EXCLUSIVELY USING ORT UP TO DAY FOUR AS PERCEIVED BY MOTHERS/FLUID INTAKE

OUTCOME		WSS CELL n = 148	G-ORS CELL n = 147	RELATIVE RISK	(CI)
DECREASED FEEDING FREQUENCY (from normal)	Day 0	78 (53.1)	109 (74.2)	0.71	(0.59-0.85)
	Day 3	21 (14.3)	92 (62.6)	0.23	(0.15-0.34)
DECREASED APPETITE	Day 0	80 (54.1)	128 (87.1)	0.62	(0.53-0.73)
	Day 3	18 (12.9)	108 (73.5)	0.17	(0.11-0.26)
DECREASED FOOD INTAKE	Day 0	83 (56.0)	54 (36.7)	1.53	(1.18-1.97)
	Day 3	52 (11.5)	17 (33.4)	0.32	(0.20-0.53)
	(n=82)		(n=89)		
DECREASED BREAST FEEDING	Day 0	14 (17.1)	7 (7.9)	2.17	(0.92-5.11) NS
	Day 3	1 (1.2)	8 (9.0)	0.14	(0.02-1.07)*

( ): Number in parenthesis indicates percentage
CI: Confidence Interval
NS: No statistical difference
* Fisher exact due to small cell size p< 0.0359800)

TABLE 8. ORT INTAKE FOR CASES USING ORT ALONE
(Follow-up for seven days or recovered)

PARAMETERS	WSS-CELL n = 135	G-ORS CELL n = 112	PROBABILITY
DAYS USED ORT			
Mean	3.97	6.32	<.0001
SD	±1.77	±1.72	
Median	3.00	7.00	
Inter-quartile Range	2.00-5.00	5.00-8.00	
AMOUNT ORT /EPISODE			
Mean	973	4,299	<.0001
SD	±674	±2,050	
Median	840	4,200	
AMOUNT ORT /DAY			
Mean	264	657	<.0001
SD	±181	±265	
Median	240	640	

TABLE 9. STATUS OF STOOLS AND VOMITING OF CASES USING ORT EXCLUSIVELY BY DAY FOUR AS PERCEIVED BY MOTHERS

OUTCOME		WSS CELL n = 148	G-ORS CELL n = 147	PROBABILITY or R.R. (CI)
STOOLS/DAY (mean ± SD)	Day 0	6.24 ±2.39	5.67 ±2.08	NS
	Day 3	2.52 ±1.03	5.15 ±1.62	<.001
INCREASED STOOL FREQUENCY (from Day O)	Day 0	148 (100)	147 (100)	* not done
	Day 3	12 (8.1)	65 (42.2)	0.18 (0.10-0.32)
LOOSE STOOLS	Day 0	148 (100)	147 (100)	* not done
	Day 3	42 (28.4)	112 (76.2)	0.37 (0.28-0.49)
VOMITING	Day 0	39 (26.4)	28 (19.1)	NS
	Day 3	9 (6.1)	18 (12.2)	NS

( ): Number in parentheses indicates percentage
CI: Confidence Interval
NS: No statistical difference
R.R.: Relative Risk Ratio

TABLE 10. WEIGHT CHANGE FROM BASELINE EXCLUSIVELY ORT AS MEASURED ONE DAY AFTER RECOVERY/OR ON DAY SEVEN

AGES	MEASURE	WSS	G-ORS	PROBABILITY
ALL AGES	n	129	100	<.OOO1
	mean grams	163.95	-162	
	SD	±134.77	±173.95	
06-12 MONTHS	n	37	31	<.OOO1
	mean grams	174	-132	
	SD	±99.74	±183.28	
13-24 (1 YR) MONTHS	n	38	29	<.OOO1
	mean grams	155.26	-175.86	
	SD	±140.84	±172.49	
24-36 (2 YR) MONTHS	n	32	23	<.OOO1
	mean grams	156.25	-178.26	
	SD	±121.65	±153.61	
37-48 (3 YR) MONTHS	n	12	12	* Not done
	mean grams	175.00	-200.00	
	SD	±217.94	±204.49	
49-49 (4 YR) MONTHS	n	10	5	* Not done
	mean grams	17O	-100	
	SD	±163.64	±158.11	

* Not done as sample size too small

A follow-up qualitative survey of the mothers in the WSS group who had used ORS in the past revealed that they preferred WSS. They felt it to be less costly (75%), more available (95%), and more effective (78%), and they perceived WSS to be a healthier solution (87%). WSS was considered to be slightly better tasting (65%) and more accepted by the child (64%). Only on the part of preparation ease was G-ORS preferred by 82 percent of mothers. When asked which solution they think they will be most apt to use on their return to Afghanistan, 90 percent stated WSS.

TABLE 11. SODIUM ANALYSIS OF ORT SOLUTIONS MADE IN THE HOMES BY MOTHERS ONE TO THREE MONTHS AFTER TRAINING/RECIPE RECALL

PARAMETERS	WSS CELL n=136	G-ORS CELL n = 128	PROBABILITY RELATIVE RISK (CI)
Na^+ mmol/l:			
Mean	57.19	83.52	<.0001
SD	20.21	19.43	
Median	52.50	85.00	
Minimum	20.00	16.00	
Maximum	110.00	130.00	
Range			
16-40 mmol/l:	33 (24.3)	7 (5.5)	
41-70	64 (47.1)	16 (2.5)	
71-110	39 (28.7)	97 (75.8)	
111-130	--	8 (6.3)	
Correct Recipe	n=138	n=127	
Water	127 (92)	114 (90)	NS
Salt	107 (78)	--	
Flour	117 (85)	--	
Correct Demonstration			
Water	123 (89)	96 (76)	1.18
Salt	104 (75)	--	(1.05-1.32)
Flour	117 (85)	--	

( ): Number in parentheses indicates percentage
CI: Confidence Interval
NS: No statistical difference

TABLE 12. PROBLEMS ENCOUNTERED WITH ORT AND POST-TRAINING SPONTANEOUS USE AS REVEALED THROUGH FOLLOW-UP QUALITATIVE QUESTIONNAIRE SURVEY OF MOTHERS

PARAMETERS	WSS CELL n = 137	G-ORS CELL n = 127
NO PROBLEM ENCOUNTERED:		
Preparation	134 (97.81)	127 (100.00)
Fuel cost	77 (56.20)	59 (46.45)
Cooking	136 (99.27)	127 (100.00)
Taste	127 (92.70)	117 (92.12)
Smell	137 (100.00)	127 (100.00)
Color	137 (100.00)	127 (100.00)
Consistency	137 (100.00)	127 (100.00)
Feeding to child	122 (89.5)	107 (84.24)
Acceptance	102 (74.45)	103 (81.10)
Stability	132 (96.35)	127 (100.00)

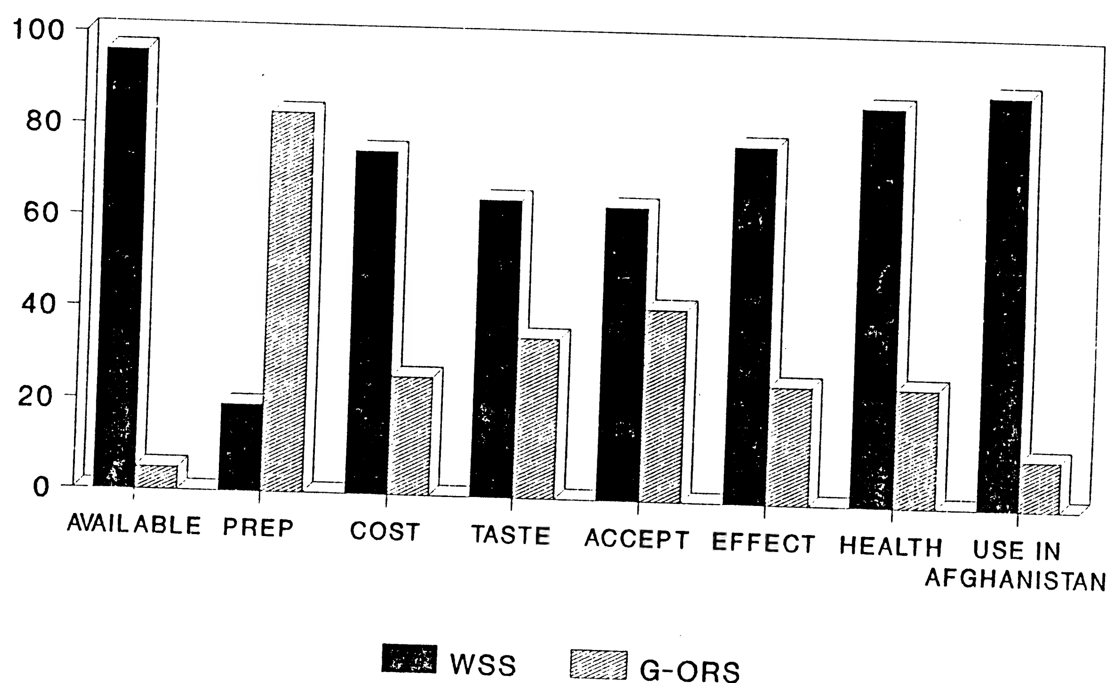
( ): Number in parentheses indicates percentage

TABLE 13. COMPARISON BETWEEN G-ORS AND WSS AMONG MOTHERS FAMILIAR WITH BOTH ORT TREATMENTS (n=137)

PARAMETERS	WSS	G-ORS
More available	131 (95.62)	7 (5.10)
Easy preparation	26 (18.97)	114 (83.21)
Less costly	103 (75.18)	35 (25.54)
Good taste	89 (64.51)	50 (35.49)
Child acceptance	87 (63.50)	57 (41.60)
More effective	107 (78.10)	36 (26.27)
Good for health	119 (86.86)	36 (26.27)
Suitable for Afghanistan	123 (89.78)	15 (10.94)

NB: Number in parentheses indicates percentage

FIGURE 3. MOTHERS' COMPARISON WSS VERSUS G-ORS



Source: Qualitative Survey

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2. BACKGROUND

Diarrhea is a critical problem in Afghan children inside Afghanistan as well as among the refugee population currently living in camps within Pakistan. Before the Soviet occupation and subsequent war of resistance, Afghanistan had the highest infant and child mortality rates in the world with diarrhea likely accounting for the majority of these deaths. Today this trend persists.

According to UNICEF's *State of the Child 1990*, the child mortality rate from all causes in Afghanistan was 97 per 1,000 population of children under age five (300 per live births).[1] Due to the total devastation of the country over the last 14 years and extreme difficulties in gathering health statistics, this figure is likely to be a conservative one.

While no statistics on diarrheal disease mortality are available from Afghanistan, extensive studies have been conducted with the refugee population in Pakistan. They reveal that diarrhea is a leading cause of death among children, accounting for 40 to 54 percent of child mortality rates in refugees living in NWFP and Baluchistan respectively. The annual incidence rates range from 4.7 to 12.6 episodes per child per year, each episode lasting from 9.2 to 8.4 days (NWFP and Baluchistan, respectively).[2] This incidence exceeds global rates (3.3/child/year) and is up to four times the rates reported in the Eastern Mediterranean region (2.7).[3]

Therefore, an Afghan child will likely experience from five to 12 episodes of diarrhea a year, each lasting from eight to nine days. One could thus expect an Afghan child to suffer from diarrhea during 30 percent of the time over a period of one year. It is clear from these data that diarrheal disease is a particularly critical problem for the Afghan refugee population in Pakistan and is more than likely worse inside Afghanistan. Therefore as a health care concern, diarrheal diseases should be the highest priority in program planning for Afghans.

To avert deaths from diarrhea which are primarily due to dehydration, early treatment in the home with an oral rehydration solution is essential. In the past the Afghan refugee health programme was promoting a salt sugar solution (SSS) for home use. Surveys done by UNCHR in 1989 revealed that this intervention was used only in three to ten percent of cases and when used mothers made it incorrectly 84-96 percent of the time, yielding potentially dangerous solutions.

Due to these serious problems, health care programs in NWFP subsequently dropped the promotion of SSS for home use while a safer and more acceptable home solution was identified.

Clinical hospital studies have been carried out since 1980 in many countries with traditional cereal-based solutions (see Section 10. Bibliography: Clinical Studies on Cereal-Based ORT). The glucose component of the commercial oral rehydration solutions (ORS) was replaced with a cereal powder such as rice, wheat, maize, and other grains. The results of these studies have demonstrated that using a cereal decreased diarrhea volumes by 30 to 50 percent, required less fluid to replace fluid losses, rehydrated the children faster, and diminished nausea and vomiting.[4] The chances of making hypertonic solutions from mixing errors are rare due to several biochemical safety factors inherent to the cereal polymer.[5]

Due to these promising clinical results and the universal availability of wheat flour in Afghan homes, wheat salt solution (WSS) has been proposed as an alternative to salt sugar solutions (SSS) for the home solution of choice among Afghan families. Until now, there had been no

experience with the application of wheat-based oral rehydration solution in the Afghan community. While clinical studies indicated that it is highly efficacious in a controlled hospital setting, it was not known whether this could be equally translated into a home environment.

To examine these questions before implementation of WSS as a standard treatment practice, the Wheat-based Oral Rehydration Therapy Project (Wheat-ORT) has been conducting studies of this intervention in three phased steps over a two year period. Phase #1 served as background to look into the feasibility of using WSS as a home solution for Afghans, while Phase #2 has been a comparative home trial. Phase #3 will test how successful implementation of this intervention will be in a larger Afghan community.

Phase #1 was carried out over a three month period from September to December 1991. During this time an extensive ethno-medical study was conducted in NWFP and Baluchistan through in-depth interviews, focus group discussions, and household observations with Afghan women representing ten geo-ethnic groups from Afghanistan. Data was collected on traditional beliefs and practices related to diarrhea, family members involved in case management, home treatments used, and women's evaluation of wheat-based ORT as a potential treatment strategy. Environmental factors related to diarrheal diseases were examined, by spending extended time in households. This included observations on the sources and handling of water and fuel, housing and sanitation conditions, use of soap, gardening, animal care, dietary habits, food preparation, weaning practices, child care, and diarrheal case management of active cases. During these visits, women were also asked to train the investigators how to prepare Afghan dishes so that they could understand traditional methods of measuring food ingredients and Afghan women's own teaching techniques. To determine the palatability of WSS, 150 women and 100 children were tested on their taste preferences between WSS and SSS. Also during Phase #1, the safety of the recipe was analyzed by weighing in a laboratory 110 samples of two pinches of salt and two fists of flour collected from Afghan women trained to make WSS.

The results of the Phase #1 study determined that WSS was culturally acceptable and a highly feasible home strategy for diarrhea case management. Information gathered on traditional beliefs and household practices suggested the design for field trials and methods on how best to train women to make WSS. The taste tests revealed that WSS was acceptable and the laboratory weights validated that women's hand measurements deliver amounts of salt and flour within safe ranges.[6]

After careful consideration of these results, the Wheat-ORT project made the decision to proceed to Phase #2 field trials. The goal of this next step was to determine systematically in a quasi-controlled setting within Afghan households if women would *perceive* WSS as effective and acceptable and if the solution made in homes would be safe. The following report describes the setting, methods, and results of the Phase #2 field trials.

3. OBJECTIVES OF PHASE #2 FIELD TRIALS

1. To determine if mothers will perceive the efficacy of WSS as compared to G-ORS.
2. To determine the failure rates of WSS as compared to G-ORS.
3. To determine the rate of recipe recall and mixing errors with both ORT therapies.
4. To determine the safety of WSS as prepared by mothers as compared to G-ORS.
5. To determine if WSS is seen as a food and thus reduces the amount of food the child is fed during diarrhea as compared to G-ORS.
6. To evaluate the maternal/child acceptance and problems encountered in making and using WSS as compared to G-ORS.
7. To determine the appropriate way of training mothers to use WSS as a home therapy.

4. PROJECT INPUTS

Time frame: 8 months (April-November 1991)

Staff:
Dr. Abdul Bari, Project Director
Ms. Saeeda Imad, Project Assistant
Mr. Ahmad Shah, Project Administrator
Six Lady Health Visitors (Data Collectors)
Eight Community Health Workers (part-time)
Ms. Helen Murphy, Primary Investigator
Dr. A. Majid Molla, Project Technical Supervisor

Funding: The Aga Khan Foundation and Canadian International Development Agency (CIDA) through the International Rescue Committee.

5. METHODS AND MATERIALS

5.1 Study Sites:

Four refugee camps and their respective Basic Health Units (BHUs) were selected for the study; two for WSS treatment (Thal Camps 1&2) and two for the control glucose ORS packets (G-ORS) treatment (Lakhti Banda and Shin Dand). In original study design, the controls were to be treated with salt sugar solution (SSS), as this is what WSS is proposed to replace. But due to the problems identified with SSS on the UNHCR survey, this design raised an ethical issue. Therefore the project decided to compare WSS with the "gold standard", glucose ORS packets currently approved by WHO/UNICEF.

All of the study camps were located in the Kohat district of NWFP, approximately two hours south of Peshawar. The selected camps for G-ORS and WSS were separated by approximately 90 kilometers to avoid cross-contamination of treatments.

The Afghans in these camps are from the same geo-ethnic group: Pashtuns from the southeastern provinces of Paktia, Paktika, Nangarhar, and Logar. They first migrated to Pakistan as early as 1978 and have since been living in semi-permanent mud housing compounds with their extended families. Originally they received rations consisting of tea, oil, wheat, sugar, and kerosene. Last year these rations were distributed inconsistently and reduced to only an intermittent supply of wheat. The majority of men are employed as casual laborers and purchase food from local markets. There is no electricity in the housing compounds. Water is obtained from a variety of sources: hand-dug wells, tube wells, protected springs, and in some cases tanker trucks.

The camps fall under the responsibility of the International Rescue Committee's (IRC) medical programs, and thus offer comparable services. Assessing the equivalency of the camps in terms of health indicators was not reliable due to the difficulty in gathering credible data in this setting, but Table 1 summarizes those statistics that were available through IRC. They reflect the same six month period that the field trials were conducted. There was no consistently different trend between the camps assigned to G-ORS and WSS for treatments, except that Shin Dand was a relatively newer camp. The camps from where the largest sample sizes came had comparable BHU visits for simple diarrhea. As most of the health indicators were not comparable between the camps, the study controlled for potentially confounding variables in case selections and in data collection within the qualitative survey.

5.2 Staff Training/Reliability of Data Collection Instruments:

The data collectors were all diploma Lady Health Visitors (LHVs) who had two to three years previous experience working in the refugee health care system under IRC. They were trained over a 15 day period on all aspects of the Control of Diarrheal Diseases (CDD) along with interviewing techniques, data collection, ORT preparation, history and physical exams for diarrhea (weights, heights, wt/hgt calculations, dehydration exams), and case selection protocols. They were *not* given any information about previous clinical trials on cereal-based ORT studies nor told the potential benefits of WSS.

All data collection instruments were tested in the field twice. Intra- and inter-reliability of the instruments were also tested. To determine intra-observer reliability, the project director measured again all quantitative measurements performed by each LHV during training as well as spot monitored in the BHUs throughout the study. The research assistant was with the teams in the households daily to monitor the recording accuracy. The primary investigator also reviewed the data collection techniques in the households through frequent visits. Inter-observer reliability was tested by having the research assistant interview one mother while the LHV team observed and recorded the responses. The six forms were then reviewed with the team together to determine consistency of the recorded answers. This method not only determined inter-observer reliability, but also served as an excellent training tool and field testing strategy. It also provided healthy competition among the team members to obtain the most accurate answers.

5.3 Study Population:

183 children presenting to the BHUs were selected for each treatment regime based on specific clinical criteria:

1. Informed consent to participate in the study
2. Age six months to five years

3. No signs of dehydration
4. Afebrile
5. No dysentery (history of blood or mucous stools)
6. No signs or symptoms of other illnesses
7. Weight/height > 80 percent
8. Diarrhea > three liquid stools/day
9. Onset > 24 hours < five days
10. No previous treatment of diarrhea

5.4 <u>Procedures</u>:

Cases were selected by the Lady Health Visitor and verified by the attending physician and/or Project Director. Thereafter base-line data was gathered as follows:

- Age/Sex
- Weight, Height, Percent/Weight/Height
- Feeding status (breast/breast+food/food)
- Feeding frequency before illness
- Date onset of diarrhea
- Date ORT begun
- Stools per day last 24 hours
- Stool consistency (watery/soft/formed)
- Times vomited last 24 hours
- Dehydration status (none)
- Appetite (none/poor/normal)
- Feeding frequency last 24 hours
- Amount of feedings (stopped/decreased/same/increased)
- Amount breast fed (stopped/decreased/same/increased)
- Amount of fluids consumed (stopped/decreased/same/increased)

The mother was then given training through demonstration and return demonstrations on how to prepare the oral rehydration solution, WSS, or G-ORS solution respectively.

Recipe

WSS	G-ORS
1 liter water	1 liter water
2 fistfuls of wheat flour	full packet of glucose ORS
2 three-finger pinches of salt	mix
mix, cook until boiling, cool	

Each child was then visited in his or her home for follow-up for seven consecutive days or until one day after recovery. During these visits the child was examined and mothers interviewed. The following data were collected on a daily basis:

5.5 <u>Data Collected Daily</u>:

- Stools per day last 24 hours*
- Stool consistency
- Times vomited last 24 hours

- Dehydration status
- Appetite
- Feeding frequency last 24 hours
- Amount of feedings
- Amount breast fed
- Amount of fluids consumed**
- Amount of ORT solution consumed last 24 hours**
- Other drug use
- Weight (last day only)
    - * Mothers kept track with knots on thread, stones in a bowl, or strike marks on a wall
    - ** Mothers' containers measured

On the first follow-up day, a container provided by the mother was marked for her to determine one liter. Any mistakes with the recipe were corrected at that time. If the mother reported that the diarrhea had stopped, the project would visit the home the next day to validate that the episode had resolved. The child was then weighed on the last visit. Cases were referred to the BHUs based on the following criteria:

1. Development of other illnesses
2. Development of dysentery
3. Treatment failures:
    - persistent vomiting
    - severe purging
    - dehydration
    - refusal to take ORT

After the completion of this quantitative trial (May-September), participating mothers were visited again in October to assess their qualitative opinions about the ORT that they now had experience using over time. The women were also asked for the ORT recipe they were using and to demonstrate the method used in preparation. This sample ORT solution was then sent for sodium analysis to determine the biochemical safety of the solution used by the mother in her home.

5.6 Data Collected to Control for Confounding Factors:

- Maternal age
- Urban/rural origin
- Time in Pakistan
- Previous CDD training through CHW or FHW programmes
- Reported literacy (read and write) of mother and father
- Father's current job
- Number of living children
- Latrine: type, hygienic condition
- Source of water: protected, unprotected

5.7 ORT Errors/Safety:

- ORT recipe recall
- ORT demonstration

- Collection of the ORT specimen for laboratory analysis of sodium

5.8 Training Methods Evaluation:

- Mothers' preferred teacher/methods for the future training
- Opinions on the best way to measure water, flour, salt
- Mothers' evaluation of availability, expense, and source of:
  - Flour
  - ORS packets
  - Salt
  - Water

5.9 Mothers' Opinions about Problems Encountered Using the ORT Solution:

- Preparation
- Fuel costs
- Cooking time
- Taste
- Administration
- Child acceptance
- Solution stability

5.10 Mothers' Opinions on the Comparison of WSS to ORS:

- Availability
- Ease of preparation
- Expense
- Taste
- Perception of child's preference
- Perception of effectiveness
- Solution considered "healthier"
- Choice for future use in Afghanistan

6. RESULTS

6.1 Group Equivalency/Physiologic:

On entry into the study, there were slightly more males than females in the G-ORS group, but this difference is not statistically significant. The children in the G-ORS group had a slightly better nutritional status as calculated by weight per height percentage but again this difference was not statistically significant. There were no differences in stool frequency rates or duration of diarrhea between the groups prior to entering into the study. Initial differences between the groups were age, feeding frequencies before the diarrheal episode, and feeding status (see Table 2). Children were older in the WSS group, with fewer children below six months of age and more in the four to five year range. Due to this, stratification was performed by age on the analysis of weight changes (see Table 10). Baseline feeding practices were also not equivalent. Mothers in the WSS group fed their child under normal conditions slightly more often. Due to this, percentage of change in feeding frequencies was analyzed as opposed to simple means. There was a difference in feeding status between the groups. This is due to the difference

ACKNOWLEDGMENTS

The study has been conducted by the International Rescue Committee under the generous support and guidance of the Aga Khan Foundation and the Canadian International Development Agency (CIDA). IRC wishes to acknowledge the vital technical support from the Aga Khan University, Karachi, in providing the data analysis tools, UNICEF Peshawar, Pakistan for providing ORT measuring equipment and the Muslim Aid-UK laboratory in Peshawar for analysis of the ORT solutions. We are grateful to the IRC Hangu Medical Program for providing the logistical support to implement the study. Finally, IRC highly appreciates the Afghan refugee community for maintaining a cordial environment of cooperation and coordination to conduct the study on their population. The workers of the study deserve special thanks for their untiring effort in conducting the study.

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PHASE II SUMMARY REPORT
A COMPARATIVE HOME FIELD TRIAL OF WHEAT SALT ORAL REHYDRATION SOLUTION (WSS) AMONG AFGHAN REFUGEE CHILDREN

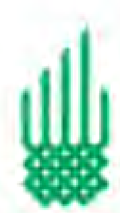


A. BARI, Project Director*
HELEN MURPHY, Primary Investigator*
A. MAJID MOLLA, Technical Advisor**
ASIF ZAIDI, Program Officer ***

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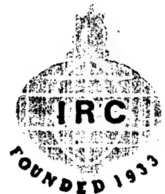






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International Rescue Committee

G.P.O. 504, PESHAWAR - PAKISTAN

11 August, 1992

Re: Wheat-Salt Oral Rehydration study

Dear Colleague,

Attached please find the Phase II Summary Report: A Comparative Home Field Trial of Wheat Salt Oral Rehydration Solution Among Afghan Refugee Children. The report summarizes the preliminary findings of a study implemented by the International Rescue Committee (IRC) and the Aga Khan Foundation in the Northwest Frontier Province of Pakistan.

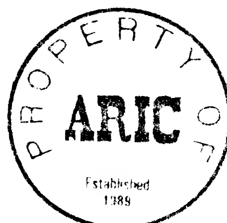
In a comparative study between Wheat-Salt Solution (WSS) and ORS packets prepared by Afghan mothers in the treatment of their children's uncomplicated diarrhea, the study finds that WSS performs significantly better by a number of indicators. The study finds that not only is WSS easier to mix and better tasting, it also substantially reduces episodes, shortens the recovery period, bolsters nutrition and reduces weight loss. The mixture is less costly and far more readily available than ORS packets and the margin of mixing error is much greater than that of home-mixed sugar-salt solution.

While a survey of less than 400 children in a remote corner of South Asia cannot be called conclusive, the findings are nevertheless striking and will hopefully inspire continued work with Wheat-Salt Oral Rehydration as an alternative to ORS packets under appropriate circumstances. IRC is circulating the report widely because we believe that the findings provide significant new thought on a treatment for the disease that claims more children's lives than any other. The significance of Wheat-Salt Oral Rehydration is even greater when viewed in context of the current repatriation of tens of thousands of Afghan refugees to the remote mountainsides of their homeland, where clinics, health workers and ORS packets may be years away. Yet, it is our hope that the circulation of the report will serve to focus dialogue and inspire replicative studies in other environments as well.

IRC appreciates your interest and welcomes your comments, questions or criticisms.

Kind Regards,

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